

## CEREBROSPINAL MENINGITIS

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THE onset of cerebrospinal meningitis is quite sudden. The patient, who may have been feeling perfectly well, is suddenly seized with high and rapidly rising fever. Severe vomiting, which so often accompanies injury to the brain, also occurs, followed by marked symptoms of mental disturbance to complete loss of consciousness or violent delirium. If consciousness returns, the patient complains of excruciating pains in the head and nape of the neck. The latter region is very sensitive to the touch, and its muscles are rigidly contracted. The most characteristic symptom is at this point often exhibited, especially in children—the head is drawn completely backward and fixed in this position. This spasm may include the whole spinal column, so that the entire body is curved backward in a frightful half-circle (opisthotonos). This extreme form of spasm I have only seen in children—never, as yet, in the adult cases which have come under my observation. A later symptom, and one which makes a peculiarly distressing impression upon the friends of the patient, is the shrill cry described by the French as the “*cri hydro-céphalique*.”

Disturbances of sight and speech, palsy, and involuntary urine and dejections complete the picture of the malady. From twenty-five to seventy-five per cent. of cases end in death. In many cases death has occurred as soon as three hours after the onset of the disease in patients who had appeared to be in perfect health.

Again, the patients appear to improvè, the fever disappears, consciousness returns, but relapses occur, and the sufferers gradually become excessively emaciated, actually wasting to skin and bone, until, after weeks, or perhaps months, they succumb to exhaustion. The cases of recovery are liable to serious sequelæ—viz., disturbed vision even to complete loss of sight, loss of the power of speech, impaired memory, imbecility, epilepsy, palsies, deafness. The latter especially is extremely common with children, yet, fortunately, of those cases who recover at all, the largest number recover completely.

The management of the disease is by no means so hopeless as is often believed. As we see that nature sometimes makes a complete cure in this disease, in contradistinction to some other forms of meningeal in-

flammation (for example, tubercular), we may believe that under intelligent care we may hope for some degree of success in handling it. In treatment lumbar puncture takes first place—that is, simply, an extraction of the spinal fluid, which, by the action of the poison, has been abnormally increased in amount, by a hollow needle inserted in the lumbar region. This removes the pressure which is the cause of the gravest symptoms. This procedure may have to be repeated a number of times in the course of the disease. Striking success has also attended the infusion of sterilized salt-solution under the skin. Several litres of this fluid can be eagerly taken up by the fluid-craving tissues, to be again given out in the form of urine and sweat, and thus an irrigation of the tissues takes place through which much of the bacterial poison is also diluted and carried out of the body. Hot baths have also been used with good effect, but no treatment must overlook the fact that complete quiet is the first necessity.

Cerebrospinal meningitis is preëminently a disease of youth. The greatest number of victims are those in childhood, youth, and early adolescence. From the thirtieth year on the death-rate diminishes to nil. Men are more liable to the disease than women. Especially susceptible are men in military service. Of sixty-two epidemics in France forty-three were exclusively confined to the soldiers. Next liable are all other closely congregated masses of humanity, as educational institutions, orphan asylums, prisons, houses of correction, etc., and precisely in proportion as these are crowded, badly aired, or dirty.

So, especially among the poor, we encounter this disease in thickly crowded, dark, and dirty living and working quarters of the laboring masses. Cerebrospinal meningitis is a filth-disease.

The infectious germ is a diplococcus, called, also, from its tendency to embed itself in pus cells, “diplococcus intracellularis.” In general it is known as the “meningococcus.” First isolated in six cases by Weichselbaum in 1887, it was definitely established by the writer as the positive cause of the disease in a later epidemic. Since then it has been demonstrated in every epidemic as well as in numerous endemic cases. The newest demonstrations are those made during the devastations of the disease in 1904 in Upper Silesia, where, since November, twelve hundred cases of illness with six hundred deaths have occurred, and in seven hundred and sixty of which cases the meningococcus has been found by Professor von Lingelsheim.

The cultivation of the coccus is difficult, as it does not develop well in artificial media.

In the autopsies the coccus is found in the inflamed areas of the pia mater of the brain and spinal cord, but by no means in large quan-

titities,—often, indeed, only after prolonged search,—quite the opposite of many other infections in which the affected organs show masses of bacteria, as, for instance, the plague. It is also found in the fluid withdrawn from the spinal cord by the needle, especially at the height of the disease. This demonstration of its presence is thus of the greatest importance for correct diagnosis and proper treatment of the disease.

The question now arises, “How does the germ penetrate to the wonderfully protected and guarded coverings of the brain and spinal cord, and how does it again escape to convey the infection to others?”

Both entrance and exit, as the writer has demonstrated, occur through the nose. Entering by the nose, and passing through the ethmoidal sinus, the germ reaches the coverings of the cerebrum, where inflammation is excited by its presence and the action of its poison. Numbers, again, issue from the nose in the excretion of the nasal mucous membrane. These excretions are spread by blowing the nose and also by sneezing, as Professor Flügge, of Breslau, some years ago demonstrated that by the act of sneezing innumerable microscopic droplets are expelled, which may float for hours in the air and be inhaled by others. This makes the possibility of infection by this means indisputably clear.

In almost all cases of cerebrospinal meningitis the cocci are found in the nasal secretion. They may persist for some time after the disease, and, though no longer dangerous to the patient, may convey the infection to others. Further, as the writer has lately demonstrated, the germ is often found in the noses of those who have been in contact with the sick, but who themselves have resisted the infection, and it often persists in such cases for some time. Such persons feel absolutely well, but may sometimes complain of a slight “cold in the head,” and may constitute a serious menace to their surroundings by disseminating the germs. The mouth, tonsils, and throat may also contain the germs and from these spaces also they may be easily conveyed to other persons.

For these reasons it is of the utmost importance, in dealing with cerebrospinal meningitis, to isolate the patient absolutely and keep his entire surroundings in quarantine; to make bacteriological tests in the case of attendants and healthy persons who may carry the disease, with isolation of these also when necessary, and to take the strictest precautions in the use and disinfection of handkerchiefs, towels, etc., with avoidance of any discharges reaching the ground, the floor, or the air.

As yet no antitoxin has been discovered, but the results of search have been so gratifying in other infections that it is reasonable to hope that such may be found in the future. Meantime the gospel of cleanliness, fresh, pure air, sunshine, and avoidance of overcrowding must be preached.